

NAVAL RAVIKANT INTERVIEW PART THREE

Hello again, Ars Technica listeners. This is the third installment of a four-part conversation about existential risks, with serial entrepreneur Naval Ravikant. If you haven't heard the first two parts – which we posted on Monday and Tuesday – I encourage you to first check them out. I'd also encourage you to watch the TED talk which I was invited to give as a result of posting this very interview with Naval to my podcast listeners, back in March. Huge thanks to both TED AND Naval for that! As mentioned before, it went up on the front page of TED.com yesterday.

Also on Ars today, George Church has posted a piece in which he discusses the vital importance of biological surveillance in this dawning era of artificial life – which could certainly include artificial pathogens one day. George points out that “three of the most low-cost and highly-effective global public health strategies are hygiene, quarantine and vaccines -- all of which rely on constant keen observation.”

George is one of the world's most influential bioengineers, and his Harvard lab has spawned a dizzying range of innovations, techniques and startups. He's also been advocating for surveillance systems in his own field of synthetic biology since 2004. As his article today points out, few would call for a comprehensive global ban on cars. Yet almost everyone supports certain levels of car and driver surveillance – via radar guns, blood-alcohol tests etc. Responsible use and careful surveillance will be even more important in the high stakes world of synbio. I recommend that you read George's piece.

I'll add that I was lucky enough to interview George for my podcast. That was Episode 24, a bit more than a year ago. You can find that on my website, at after-on.com. Or just search for “After On” in your favorite podcasting app.

Speaking of synbio – in today's installment of my conversation with Naval, he and I dive deep into the profound dangers that malicious uses of powerful technology could present. We'll pick up with the last minute or so of yesterday's conversation, to give you some context. And here we go:

TRANSITION MUSIC

The green part is a repetition from the end of the previous installment

Naval: At any given time on the planet, there's a few people – One is too many.

Rob: One is too many.

Naval: If you gave them a button that would end this planet, they would press the button.

Rob: If there were such a button and one day everybody woke up and they had access to that button --

Naval: The world would have to be a very civilized place.

You would basically have to make everybody really happy. But that's what we're talking about, over a long enough timescale everyone's going to have that button. Again: long enough timescale, that's where we're headed. Going back to the physicists for a second, one of our favorites, Enrico Fermi is well known for the Fermi Paradox. The Fermi paradox is, if

the universe is so large and it's so old, how come we haven't encountered any other intelligent life yet?

For a little while, we had this very parochial point of view, which seemed like an offshoot of the hypothesis that the earth was the center of the universe before Tycho Brahe and Johannes Kepler disabused us of that. People used to have this notion, the world is unique, the earth is special, there's only one planet with water and with life. But now, we've found thousands, tens of thousands of planets, as we launch bigger and bigger telescopes, that are capable of bearing life.

So the universe is littered with them and we have only been around this civilization for 5 or 7,000 years. We've only been around as a species for a few hundred thousand years. We've only been around as life on this planet for a few billion years. Where is everybody? I actually think the most likely, plausible explanation is the Great Filter hypothesis – and the Great Filter hypothesis is that any sufficiently advanced civilization, blows itself up.

Rob: When people started first wrestling with that possibility – back, probably, in the '50s, when the Drake equation was first created, that asked how many advanced civilizations might be out there – they were thinking in terms of nuclear danger. But today we're seeing other technologies that are on the intermediate, even near-term horizon that can also potentially have an annihilating impact.

Naval: Yes, before we even get to our favorite topics synbio which is, I think, where much of the near term danger comes from; on the Great Filter hypothesis, there's another one that was recently popularised by I believe Cixin Liu. Apologies if I get his name wrong, but the famous si-fi author who wrote the *Three Body-Problem*. He has a hypothesis called the Dark Forest hypothesis, where the universe is like a dark forest that we're all tiptoeing through. And whoever makes a noise identifies themselves to the other predators in the forest, who immediately kill it. Because we all have killing power and first strikes are so powerful in a technologically advanced society, that whoever finds the other one first, instead of saying hello, they just wipe you out, just in case. It's the exact opposite of the prime directive from *Star Trek*.

[laughter]

The problem with the Dark Forest hypothesis is that any species that's capable of destroying another species immediately on contact was first capable of destroying itself. So how did it make it through that whole situation? Through that great filter? The only solution that I can come up with is not a great one, but it's the Borg solution which is, you all become one thing. I don't try to kill myself. You don't try to kill yourself. Even though individual cells may go rogue, they don't have the ability to shut your whole body down, because we've decided the unit is one thing and has a central intelligence and a central command.

Rob: Is the presumption that Borg-like intelligence would, in an abundance of caution, annihilate any species that they came across?

Naval: On that one, I'm a little optimistic, because I think to become a Borg-like civilization you would have to have become pacifists first.

Rob: In order to survive to that level.

Naval: That's right. You would care more about the collective.

Rob: Well, you had mentioned synbio. To me, the powerful example is the Human Genome Project. Which is really, technically, a step before synthetic biology – it's about reading DNA matter rather than altering it. But there's something that is sometimes referred to as the Carlson curve, which is the curve that traces how rapidly the price and performance improves in the realm of genomic sequencing and synthetic biology in general. And it makes the Moore's Law curve of computing look pokey. The statistic is, Human Genome Project ended in 2003. It took 13 years, it cost about \$3 billion. It involved thousands of the top scientists throughout the world, and its result was a single haploid genome.

And today, substantially more work can be achieved for about \$1,000. So, one three millionth the cost of the Human Genome Project. By a lone lab tech – which might very well be an undergrad or even a high school kid – working with the proper equipment in the span of about a day or maybe two days. That's the rate of improvement that we have.

And, in contemplating what might become possible with synthetic biology – particularly viewing it through this grim lens that we're looking at things through right now – try to imagine the field of synthetic biology today. Everything that it's doing that's amazing with CRISPR and with other technologies. Imagine the total output of that field over the coming 15 years. Who knows what it will be? But we can imagine it will be profound. And then, imagine that unit of work – that which the entire field achieves in 15 years – eventually becoming an easy days work for a lone undergraduate. Would that be a more or less stable world than a world of thousands of sovereign nuclear powers? Because if we had gotten as good and efficient with nukes after the Manhattan Project, you would have had nuclear weapons in thousands of garages and college laboratories by the mid 1960s.

Naval: Synthetic biology will be the first one to deliver world-ending capability to individuals.

Rob: It'll come before nanotechnology.

Naval: Yes, nanotech is still way off.

Rob: Other technologies that sometimes people site as potentially having very asymmetric powers in the future include geoengineering.

Naval: There's always the possibility for a black swan. By definition, they're unpredictable. But the clear, current progress rate of synthetic bio may have already gotten us there. You had this horrific example you gave about how they modified one of the flu viruses.

Rob: Yeah, and this was in the ancient year of 2011. So this is the kind of thing that not only *could* be done, but *has* been done. It has been done with tools that are, by today's standards, relatively primitive. Back in 2011, researchers in Holland and Wisconsin, were working with something called H5N1 flu. Now, H5N1 flu is literally 3,000 times more lethal than swine flu. And swine flu is very rightly feared. But H5N1 kills 60% of the people that it infects, whereas swine flu kills 0.02% of the people it infects – so, 3,000 times more lethal.

The one thing we can like about H5N1 flu is, it is not very contagious at all. There's only been, I believe, a few dozen deaths from H5N1 in the entire history of the world. What these researchers did is they created a highly contagious version of H5N1. And they kept it under lock and key and they did it as part of a virology experiment. These weren't bad guys. But the *Journal Science*, writing about this experiment – and *Science* is one of the two most revered publications in the world of scientific research, the other being *Nature*. The news arm of the

journal *Science* wrote, this strain could “Change world history if it were set free” by triggering a pandemic “quite possibly with many millions of deaths.”

At the same time, there was a person whose title was the US National Science Advisory Board Chairman for biosecurity – his name is Paul Kime. He said, "I can't think of another pathogenic organism that is as scary as this one. I don't think anthrax is scary at all compared to this." And this guy was an anthrax expert. So that happened back in 2011. Now, there's an optimistic way of viewing this, which is that this was a very carefully sequestered critter. It was probably deep in some biosafety vault on both sides of the Atlantic. And there was no way it was going to teleport into your Caesar salad tomorrow.

Another way of looking at it is they created, basically, very tiny data files. The whole flu genome is about 15,000 letters. That's very, very small. The number of modifications that went into this particular mod, I don't know, but my guess is they could probably fit on a Post-It note. And anybody who gets their hands on that tiny list of changes – whether it's in 2011, today or 30 years in the future – would have a trivially easy time reanimating that particularly contagious strain of H5N1.

Now, 2011 was before CRISPR was invented. CRISPR is an editing technology, which has radically enabled and radically eased the process of editing a genome. It has diffused to the point where CRISPR is widely practiced in high-end, high school biology labs. And I'd say that's a good thing. I think synthetic biology has an enormous amount of promise for humans, and it should be taught to young folks, et cetera. But there is this terrible danger that as this proliferates, there will be more and more turbocharged pathogens generated.

Naval: What we've basically done with synthetic biology, we've taken designing and hacking humans from the physical domain to the digital domain.

It's a similar problem that people keep creating new computer viruses. But unlike computers, when a human crashes, it's fatal. There's no reboot.

Rob: And I think it's safe to guess that a desktop DNA synthesizer from the year 2038 will be capable of things that the entire project of synthetic biology is incapable of today. There's a writer named Richard Preston, who wrote a book that some people probably know called *The Hot Zone*. He's written fiction that's based on bioterror and bio-error; he's written science fact that's based on bioterror and bio-error, and the quote of his that resonates with me is this: “The main thing that stands between the human species and the creation of a super virus, is a sense of responsibility among the individual biologists.”

The danger is that we'll become vulnerable to the ethics of ever-larger groups of people. We were vulnerable to the ethics of two people in 2011. They were good guys – they were actually virologists. Today, there's probably hundreds of people who – enabled by CRISPR – could do the things that were done in 2011. And at some point, that's going to extend to the world's elite life science grad students. And at some point, it's going to extend beyond them.

Naval: It seems like this is one of those fears that is almost built into the human species. We all realize this at some level. Everyone watches zombie movies, why? It's basically warning you what to do when the plague comes. Now, when the real plague comes, unfortunately I don't think people will look grey and green and be lumbering around slowly. They'll be your loved ones, coughing and feeling sick very quickly. Or, if it's an engineered virus, it could be something that shows no symptoms until everybody drops dead 10 days later.

We do have some sense of alarm already built into our science fiction genres. I would argue that science fiction and movies actually warn people. Peter Thiel famously critiqued sci-fi because, he said, "There's no more optimistic sci-fi," in the '50s and '60s we had all this optimistic sci-fi. Star Trek was very positive and optimistic but nowadays it's all apocalyptic and negative. And I think that's because a lot of film makers rightly recognize that we are approaching a singularity but a singularity of a different kind, where a single individual can end everything.

Rob: And particularly when we start talking about synthetic biology, I worry more about the lone nihilist than the organized terror groups. Because with relatively few exceptions – and really the only exception I've been able to identify was called Aum Shinrikyo. They famously attacked the Tokyo subway with sarin gas back in the '90s. But generally speaking, terror groups are discriminate by nature and the kind of attack that you would carry out with synthetic biology or perhaps a nanotechnology some other things are indiscriminate by nature. So I do worry more about the lone nihilist.

Naval: I'll give you another scenario, I don't think it requires a lone nihilist. I think you can actually easily assemble a group of nihilists.

Rob: Once again, you've said, "pessimistic as you are, Rob, you're being too optimistic here." So tell me how you assemble –

Naval: I'm not trying to be a pessimist, I don't want to create world war three here.

Rob: No, the reason why we're in this conversation is I don't think you're a pessimist, I actually think you're a realist.

Naval: Yes. I'm a big believer in human freedoms and I'm not convinced that we need to start forbidding things.

Rob: Quite the opposite, as we'll discuss.

Naval: Right. But, I think it's quite easy to organize a group to work on this. There are multiple groups in history that have been wiped out, that have been eradicated, genocided. And very often, groups of people have essentially all committed mass suicide because they knew they were going to die. There's a famous one with some Jews who were surrounded by the Romans and rather than let themselves be enslaved by the Romans they killed their own families, drew straws, and then killed themselves. When India was being invaded by Islam, castles that were under siege, when they were falling, everybody inside would kill themselves.

Now the worst scenario – again, popular movies and literatures are so far ahead of us – is the Dr. Strangelove scenario. *Dr. Strangelove* the movie came out after the nuclear weapons were created in world war two. And the fear was that the US and the Soviet Union had created doomsday devices. Doomsday devices basically said, "Don't try and kill me because if you kill me this automatically goes off and kills everybody." The problem is that doomsday devices will not stop at the nation-state level, they'll propagate to the group level. So if you are in a subgroup, a minority, that is being eliminated and eradicated – what you may do is create a doomsday device. And you say, "If we get taken out, everybody gets taken out." This is where you can get a group of intelligent people together to work on the problem.

Rob: That's really interesting.

Naval: So you can have a proliferation of multiple doomsday devices.

Rob: That's very interesting. Using the Masada example, which is the one for Jewish history, you could hypothetically say if the state of Israel was about to get annihilated--

Naval: Exactly, they might unveil a doomsday device. They might say, "Oh, By the way – we've got one of these." Then it turns out so do the North Koreans and so do the Kurds and so does ISIS and so on and so forth.

Rob: Then so do smaller and smaller groups, it might be the Rohingya in Burma, in Myanmar, who decide to create such a thing.

Naval: So if you can get sufficient group loyalty, it's very easy to create a suicide cult. Even the anti-natalists – they're extreme environmentalists who might go in on this because they're like, "Well humans are kind of the plague that's infesting the earth, let's get rid of humans and it goes back to paradise." And again, movies warn about this. If you remember *12 Monkeys* – Terry Gilliam's famous thriller about a synbio attack. Or *28 Days Later*, the zombie movie.

Rob: And one reason why my delusion that it would be really be nihilist individuals that we needed to be concerned about was soothing to me, is because groups are, of course, far more dangerous than individuals. Because they can pool skills and they can be in more places than one at once.

Naval: They can do it with current, or close to current technology.

Rob: Yes. And when I think about the lone nihilist I worry about people like the person who shot up that theatre in Aurora, Colorado. It was a *Batman* premiere, the guy who famously dressed as the Joker. He was an elite life-sciences PhD student. So he was in that relatively narrow circle of people that we would have to worry about. Because as time passes and a group of people grows the odds of somebody from that group doing something terrible, and bizarre, and completely off the rails goes somewhere from being slim, to being somewhere like high, to being somewhere like near certainty. So, we've posed this terrible instability that we believe, to varying degrees, lies in the intermediate future. You're probably more pessimistic than I am. I believe there are things that we can do to preclude this.

Naval: Solutions. I have a set of potential solutions but it's just not the world I want to live in. So I'm in denial in that in the sense.

Rob: I don't want the extreme ones. And so, here's what I think we need to do. You talked about Dr. Strangelove. I think that's a very powerful example. We did survive the Cold War, and I think part of the reason for that was, we got very good at telling ourselves ghost stories. We got very good at freaking out in a way that turned out to be very, very productive.

Naval: That is a great point. I mean, the first thing I worried about, even doing this podcast, is: should we be sounding an alarm? Do we want to be alarmist? The problem is, if you stick your head in the sand, it's not going away. As you said, this is on the Carlson curve?

Rob: The Carlson curve, yes.

Naval: Which is much steeper than Moore's Law curve?

Rob: Much steeper.

Naval: This is not even like AGI, where it's theoretical. It's inevitable.

Rob: It's coming.

Naval: So at this point, one way out of this is to create such an allergic and immune response in every human that when they get the idea that someone is capable of something like this, that it just creates an immune response for the whole species, right? Where essentially, every cell in the body becomes a white blood cell. And that may buy us quite a bit of time. I have young kids. I want people to be aware. I want people to be on their guard for it, rather than having some horribly, catastrophic thing that happens, that's sort of a near miss, which wakes us up. Because the crack down and the wake of that could be far worse. We lost 3,000 people on 9/11 and we're still paying for it today, in terms of the lost freedoms and all these extra wars that we ended up fighting. Better to be informed and prepared.

Rob: You've just said two things that make me think of immune systems. First of all, you had said all of us could be white blood cells to counteract this kind of attack. And I really love that analogy because first of all, obviously, none of us would survive even a day without our immune systems. And our immune systems, they got trained up when they get exposed to new viruses – and training the societal immune system, to start having some awareness and some concern about these scenarios now, is maybe akin to giving a vaccine of some sort.

Naval: Yes. It's a very interesting problem and immune systems have to be trained very, very carefully.

Rob: Then the other thing is what you just said about 9/11. That's the immune system overreacting. If you die of a sepsis infection, it's usually because your immune system overreacted to an extent that it started causing damage to your organs.

On a more narrow level, there is something called a cytokine response storm. That's something that happens sometimes in immunotherapy. Cytokines are things that signal the immune system to more and more white blood cells, and sometimes you get into a situation where there is so many of these signals going out to make more and more white blood cells, that the body essentially creates a crippling number of white blood cells, and then kills itself.

And so, the 9/11 example you just cited is an extreme case of that. We didn't nip the original infection in the bud, and then we had this radical sepsis-like overreaction, spending trillion of dollars and killing a lot more than 3,000 people.

Naval: The Patriot Act, what it did to our freedoms, which are still going on to this day, and which just live now in a surveillance state, which is now all forgiven because of 9/11. In fact, when 9/11 happened – that day at work, I said to one of my co-workers, "There's gonna be a war over this." I didn't know who. I didn't know where. And I was wrong. There were *two*. In a drone strike on a commercial aviation scenario, you could easily imagine that the overreaction that we have afterwards may be worse than the actual, initial problem.

Rob: That's why you have to follow this very, very careful and narrow balance between training the immune system to recognize a new threat. Which is really all what we are talking about today – a lone wolf or a small organization doing terrible things with new technologies. But the reason that you really have to train that immune system is if even a failed attack gets through, the overreaction could be what really, really cripples us. If you consider the worst possible synbio attack to be something that is eradicating of all us. Something that could be a trivial failure on that scale – It kills 1% of us – could just cripple society.

Naval: It's very hard to do these counterfactuals. For example, 9/11. The response to that may be an overreaction – but, in a parallel universe, it could've turned out if we hadn't had that reaction, then they would've gotten their hands in a nuclear weapon. It's impossible to say, so the immune system is going to react the way it's going to react. But I agree with you in that training it is very important. We don't want everyone to be Big Brother. Every neighbor spying on everyone and constantly surveilling and reporting on everyone. That's a nightmare scenario. But at the same time, these new categories of technologies are just enabling new categories of threats that the immune system has to be trained to recognize and then respond to.

So what are the things that we can do? I like your idea of ghost stories. For example, *Ex Machina*, if you remember that movie.

Rob: Brilliant movie.

Naval: Brilliant movie. It's about an AGI threat. We have the zombie movies. It's been a while since I've seen a good synbio threat movie.

Rob: It has been a while, so to just go briefly back to the Cold War example. We did tell ourselves these terrible ghost stories with names like *War Games* and *Dr. Strangelove* and *Failsafe* and *On The Beach*. And as a result of that, everybody knew what the worst case stakes were.

Naval: There was a time shortly after World War II when both the Soviet Union and the US believed that a nuclear war was winnable.

Rob: Exactly, and we cured ourselves of that by talking about it and fearing it and working very, very hard on contingency plans.

Naval: It took scenarios like nuclear winters to show that even a small number of nuclear weapons being detonated in the atmosphere could end all life on earth. When it comes to plague stuff, we've lost track. Plagues in human history used to be far, far, far worse. There was a plague in 536 – they have now discovered 536 AD. Between a third and a half of the people in the Eastern Roman Empire, the Byzantine Roman Empire, were believed to have died from plague. Think of a half or a third of all the people you know dying of plague.

Rob: What's chilling about that is just thinking about how less resilient society is today. If you can imagine some kind of a synbio or other attack grievously sickening, let's say 1% of the population, most cities don't even have a fifth that much hospital bed capacity. Whereas in the Middle Ages, people were tough enough to shake off the deaths of five, 10, 20, 30% of their neighbors. I don't know what happens in an American urban area when 80% of the people who are stampeding a hospital, life threatening situations, are turned away for lack of beds.

Naval: One analogy this World War II. World War II was highly devastating for communities that were fairly built up from a civilizational perspective, not as much as we are today. They seemed to toughen up when they needed to because there is no other option. But, we are now much more densely packed in urban areas. We have much more complex supply chains for even basic necessities like food and water and power. So if we were out of food and water and power, for example in Manhattan, it would be a complete disaster. Much more so than it would have been in the Manhattan of 100 years ago.

Rob: Yes, and it seems like we have these single service dependencies, for lack of a better word, today. If the power goes out – completely out – that shuts down pretty much everything. The food starts spoiling, the cops can't communicate with one another, there's no way to navigate after dark. All exits from a city are going to be blocked.

Naval: We use civilization to put humans in more precarious locations than they would have been otherwise. Whether it's living on the floodplain, or living in the desert, or living behind bridges, behind single roads, or air delivery – there's just a lot more humans who could be stranded.

Rob: Also, thinking about what it'd be like to be invaded in 1939. I would imagine even in Northern Europe, there were very, very large sections of cities that were unelectrified or, at least, people that were living without electricity, probably had fairly recent memories of being without it. People were just much closer to living more directly off of the earth and more directly by their hands and the sweat of their labor than we are today. A biological attack that fell radically short of the worst case scenario could just be so devastating because of the knock-on effect.

Naval: Well, biological attacks create a level of fear that it is ongoing that other kinds of problems don't. For example, if there is an earthquake, after the earthquake has passed, everybody comes out to help everybody else. If there's a plague or a biological attack, everyone goes into hiding and nobody wants to help anybody else because they get sick, too.

Rob: Which brings us to this amazing term you came up with when we were exchanging emails about my series of essays on these topics, and later tweeted, and it resonated with a lot of people which was the 'Ender'.

Naval: Yes, I believe that if you want to get a message out, you have to brand it and you have to put it in terms of people can easily synthesize, understand immediately and transmit. Like you said, the *Terminator* scenario, the Skynet scenario for AI – everybody knows what that is, so it's very easy to communicate. To me, the idea of an individual trying to kill everyone on earth – this person is an “Ender.” I'm riffing a little bit off of that book *Ender's Game*, it doesn't quite mean the same thing.

Rob: I thought it was a brilliant term when you came up with that. I'd been thinking about these topics – I won't say “nonstop.” But an awful lot for a couple of months, because I was writing this for long essays, for Medium, that wrestled with it. And I'd sent you the first draft of the first one or something like that. And we started lobbing emails back and forth. And you came up with this really really powerful term because it is so succinct. It has an echo of something that we're familiar with.

But we've just spent most of the last hour defining the Ender. And so, it is a complicated topic that could benefit a great deal from traveling with just a couple of words and a few syllables. Another analogy, I think I've mentioned to you before is this phrase, 'the tipping point'. It's a powerful phrase. Probably most educated people understand what it means and have used it. And the fact is, that term has a birth date. It was coined by Malcolm Gladwell in an essay in the *New Yorker*, probably 20-something years ago. He defined what a tipping point was. He came up with the term, and it's a great little essay, later titled a book after it.

I'd be surprised if more than 1% of the people who successfully use that term actually read the essay. And it's a complicated term and it conveys a great deal. I can now say, "Hey, you know, the tipping point in this market, or in this political situation, or whatever was, came at such and such a time when such and such happened." Now, all of the sudden, thousands of

words of defining something has been collapsed into something very concise, where sophisticated conversations can be held. The trouble is, does it become aspirational? Like, is the term too good?

Naval: Right, we don't want it to become aspirational. It's not something I want to see exist. Nor do I want to turn it into some sort of biblical prophecy, where then, people are looking forward to the Ender. Because there's always some psychopaths out there who are. But I think it's important for us to recognize that these kinds of people exist. I wouldn't lionize it. It's not a positive thing. This is obviously a terrible, unloved, unlovable person to the extent that if they succeed, obviously, no one's around to-

Rob: Applaud them.

Naval: -applaud them. And if they fail, they'll be the most hated, reviled person in history. They're not doing themselves or their progeny, or their friends or family, or even their ideologies any favors, because they're forever going to be associated with a horrible thing. And let's face it – most of them are going to be inept.

Rob: It's one more chance to fail.

Naval: So I think every time any one of them fails, the idea would be to not give them any attention. But as we've shown through terrorism, we don't really do that. We give it a lot of attention. But I think the way to look upon this character is like a Gollum-type character from *Lord of the Rings*. This pathetic, evil, bumbling, inept character that no one should aspire to be. But at the same time, it is important to get the message out. We need terminology and vocabulary to be able to communicate. We need to be able to transmit the information, to absorb it, and to keep an eye out for it. And if someone says, "Hey, I think so and so wants to be an Ender", that gets the point across to how we should investigate that person.

Rob: Gollum is actually a really, really good example. Nobody wants to be Gollum when kids go around playing *The Hobbit*.

Naval: Yes. The real Ender is likely to be a Gollum-type character. Someone who is warped and distorted, unhappy and miserable.

Rob: Another term might be, for the failed Ender – I was thinking last night – enderlings. [laughs] An enderling is somebody who tries and fails. And most people are going to fail spectacularly in this objective.

Naval: Some combination of a credible attack by an Ender –

Rob: Enderling.

Naval: Thank you – enderling. Combined with the cytokine response could take out a lot of humanity and civil society as we know it.

Rob: Which is why we need to marshal our immune system against enderlings, because there's going to be thousands of them for every Ender. And hopefully, there'll be an infinite ratio, because – I think, if we think hard enough about it and early enough about it, there won't be an Ender. But people have been attempting to kill as many people as possible on the act of dying for as long as we have records.

Naval: This is going to be a little sappy but my conclusion is that you're not going to be able to stop them purely through surveillance, or creating a totalitarian society, or Big Brother watching, because that creates its own immune response. And you're not going to be able to stop them by stopping technology, for all the reasons we've already talked about. So, really, the only way is to not create them in the first place. And to not create them, means that we all just need to learn how to make sure nobody goes unloved.

END INTERVIEW ELEMENT OF PART THREE

Actually Naval, I don't think that's sappy at all. And anyone who saw my TED talk will know this – because I directly quote the bit about making sure no one goes unloved toward the end of.

Now, if you can't wait to hear part four of my conversation with Naval you *can* binge that last half hour or so on my website – which is at after-on.com. Just listen to the second half, of Episode 45, which went up on March 21st.

Also on my site, you can hear that really cool conversation I had with Kevin Rose, on a similar set of themes. In that case, Kevin actually interviewed me for his own podcast, The Kevin Rose Show – an excellent show in general, which I strongly recommend. Yesterday we both posted that interview to our respective podcast audiences, to coincide with the release of my TED talk. So thanks again for that, Kevin.

If you enjoy any of this, I also encourage you to browse my podcast's archive of fifty episodes with various thinkers, founders & scientists. In addition to synthetic biology (which gets a lot of coverage on my show) you'll find conversations with brilliant leaders in astrophysics. Neuroscience. Cryptocurrency. Consciousness. Drones. Augmented reality – and a whole lot more.

That's it for now. I hope you'll join me here again tomorrow, for the final installment of my conversation with Naval Ravikant.

OUTRO MUSIC